Dr. Igor K. Kulikov

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Education and Experience

2000-present Quantum Computing Technologies Group, Exploration Systems Autonomy Section 367, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA. Analyzing the properties of BEC of trapped alkali atoms and degenerate Fermi gases in external gravitation fields.

1999-2000 UTA Inc., for Ocean Science, Section 3237. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA. Studied the properties and propagation of non-linear inertia gravity, Rossby and Kelvin waves in ocean.

1996-1999 Post-Doctoral Fellow at Jet Propulsion Laboratory. California Institute of Technology, Pasadena, CA. Radar Science, Section 3340. Developed Markov random field algorithms for structure formation and classification of SAR images. Studied the problem of penetration and attenuation of electromagnetic waves in various mediums.

1993-1996 Ph.D. in Physics. School of Physics, Georgia Institute of Technology, Atlanta, GA. Ph.D. Dissertation: “Temperature, Topology and Quantum Fields”. Work included the analysis of the influence of temperature, geometry and topology on the high-energy behavior of quantum systems. Studied the statistical and thermodynamical properties of quantum Bose and Fermi gases at low temperatures in external gravitational fields. Studied properties of BEC in curved space-time.

1988-1991 Associate professor in the Department of Physics. Krasnodar State University. Krasnodar, Russia. Delivered lectures and supervised labs on Methods of Mathematical Physics, Statistical and Quantum Mechanics, Special and General Relativity Supervised M.S. graduate students in the area of theoretical physics.

1982-1987 Ph.D. in Physics. Moscow University, Moscow, Russia. Ph.D. Dissertation: “Quantum field models with dynamical violation of symmetry in topologically non-trivial space-time”. Studied the problem of dynamical mass generation and violation of the symmetries of bosonic and fermionic field models, the influence of gravity on the dynamical properties of Bose and Fermi ensembles at finite temperature.

1974-1979 M.S. in Physics. Krasnodar State University, Krasnodar, Russia. M.S. Thesis: “Energetic spectrum of admixture atoms in crystals”. Worked in the area of quantum mechanics of solid state and studied energetic spectrum of atoms in crystals.

Specialization: Physics, applied mathematics

Areas of Research Interests:

Finite temperature field theory in curved space-time. Statistical mechanics and critical phenomena. Properties of BEC and degenerate Fermi gases in gravitational fields.

Programming Languages and Operating Systems:

C / C++, FORTRAN, Interactive Data Language (IDL), Mathematica
UNIX, LINUX and Macintosh platforms.

Citizenship: US citizen.

Publications:

Kulikov I. *"Trapped Fermi gas in gravitational field"* prepared for publication

Kulikov I. *"Bose-Einstein condensate in non-homogeneous gravitational field"* submitted for publication

Kulikov I. *"Thermodynamics of trapped fermions in gravitational field"* submitted for publication

Kulikov I. *"Harmonic oscillator in external fields"*
NASA Tech Briefs, 2001,Number: 30262

Kulikov I. *"An influence of gravitational field on properties of trapped fermions"*
NASA Tech Briefs, 2001,Number: 30248

Kulikov I. *"An influence of gravitational field on thermodynamics of trapped fermions"*
NASA Tech Briefs, 2001, Number: 30227

Kulikov I. *"Confined BEC in External Gravitational field"*
NASA Tech Briefs, 2001, Number: 30215

Kulikov I. *''Scalar $\lambda\varphi^4$ model at nontrivial topology'''*
International Journal of Theoretical Physics **38**, (1999), pp. 2511-2533

George F Hepner, Bijan Houshmand, Igor Kulikov and Nevin Bryant
''Investigation of the Integration of AVIRIS and IFSAR for urban analysis''
Photogrammetric Engineering and Remote Sensing **64,** n **8**, (1998), pp 813-820

Kulikov I. & Pronin P. *''Low temperature properties of quantum fermi gas in curved space-time''*
International Journal of Theoretical Physics **34**, (1995), pp. 1843-1854

Kulikov I. & Pronin P. *''Bose gas in gravitational field ''*
International Journal of Theoretical Physics **32**, (1993), pp. 1261-1273

Kulikov I. & Pronin P. ‘‘*Induced Chern-Simons mass term at finite temperature in curved space-time ’‘*
Europhysics Letters **17**, (1992), pp.103-107

Kulikov I. & Pronin P. ‘‘*Induced Chern-Simons mass term in Riemann-Kartan space-time’‘’*
Vestnik MGU (Moscow State University) Ser. Physics 6, (1992), pp. 4

Kulikov I. & Pronin P. ‘‘*Topology and chiral symmetry breaking in four-fermion interaction ’‘*
Acta Physica Polonica **B 20**, (1989), 713-722.

Kulikov I. & Pronin P. ‘‘*Non-equilibrium statistics and thermodynamics of Bose gas and photon gas in curved space-time’‘’*
Collection of scientific works ‘‘Problems of Gravity, Relativistic Kinetics and Evolution of the Universe’‘ Kazan-1988, pp. 17-39

Kulikov I. & P. Pronin. ‘‘*Finite temperature contributions to the renormalized energy-momentum tensor for an arbitrary curved space-time ’‘*
Czechoslovak Journal of Physics **B 38**, (1988), pp. 121-128

Kulikov I. ‘‘*Effective potential of four-fermion interaction in topological non-trivial space-time’‘*
Izvestia VUZov, Fizika **3**, (1988), pp. 5-8

Kulikov I. & Pronin P. ‘‘*Chemical potential of Bose and Fermi systems in curved space-time ’‘*
Collection of scientific works ‘‘*Gravity and Theories of Space-time ’‘*, Moscow, 1987

Kulikov I. & Pronin P. ‘‘*Local quantum statistics in an arbitrary curved space-time ’‘*
Pramana Journal of Physics **28**, (1987), pp. 355-359

Kulikov I. & Pronin P. ‘‘*Topology and fermionic condensate ’‘*
Annalen der Physik **7**, (1987), pp. 100-102

Kulikov I. ‘‘*Dynamical restoration of symmetry in preon models ’‘*
7-th Congress of Young Scientists. Series: Mathematics, Physics,Chemistry.
(VIN 7.12.84, 35036-84)